

*What is claimed is:*

1. A post singulation, die separation assembly configured for separating adhesive wafer saw tape from the plurality of dice of a singulated wafer, said assembly comprising:

5 a support base defining a support surface and having a first portion and an opposite second portion thereof, said second portion including a down-ramped portion thereof skewed downwardly at a first acute angle from the support surface;

a feed tray having a collection end positioned adjacent the base second portion such that an elongated, substantially thin gap is formed between the tray collection end and at least a portion of the base second portion; and

10 a flexible platform movably supported atop the base support surface for movement from said first portion to said second portion thereof, and downward through the gap formed between the tray collection end and the at least a portion of the base second portion, said platform defining an upward facing surface upon which the singulated wafer is adhered thereto, via the saw tape, each die being in a forward aligned manner;

15 wherein, upon movement of said flexible platform down said down-ramped portion, a portion of the wafer saw tape thereat is peeled away from the respective die, separating and releasing the respective die onto the collection end of the feed tray in a manner substantially maintaining the forward alignment orientation of each die.

20 2. The separation assembly as recited in claim 1, wherein said first acute angle is in the range of about 60° to about 90°.

25 3. The separation assembly as recited in claim 2, wherein the base second portion includes an up-ramp portion of the base skewed upwardly at a second acute angle from the support surface portion, said up-ramp portion and said down-ramp portion intersecting an apex edge portion where said saw tape is peeled away from the respective die during movement of the adhered wafer thereto.

4. The separation assembly as recited in claim 3, wherein  
said first acute angle is in the range of about 45° to about 60° and said second  
acute angle is in the range of about 15° to about 30° and, forming an intersection  
angle of said apex edge portion in the range of about 90° to about 120°.

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5. The separation assembly as recited in claim 4, wherein  
said collection end of the feed tray includes a collection surface disposed at an  
elevation proximate that of the apex edge portion.

10 6. The separation assembly as recited in claim 1, wherein  
the thin gap formed between the tray collection end and the down-ramped  
portion is less than the height of the separated die and more than the combined  
thickness of the flexible platform and the adhered saw tape.

15 7. The separation assembly as recited in claim 1, further including:  
a top plate device positioned proximate to said base second portion, and  
spaced-apart from the base support surface by a distance sufficient to substantially  
prevent flipping of the respective die during separation from the saw tape, while  
maintaining said forward alignment orientation of the die.

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8. The separation assembly as recited in claim 7, wherein  
the spaced-apart distance between a bottom surface of said top plate device  
and the base support surface is at least less than two times the height of the die.

25 9. The separation assembly as recited in claim 1, further including:  
a driven roller assembly having a first roller and a second roller wherein said  
flexible platform is in the form of an elongated sheet material having one end wound  
around the first roller, and the opposite end wound around the second roller for said  
selective movement of the flexible platform from the first portion to the second  
30 portion of the base member.

10. The separation assembly as recited in claim 9, wherein  
said elongated sheet material is provided by a one-sided tape material.

11. The separation assembly as recited in claim 1, wherein  
5 said flexible platform is provided by a one-sided tape material.

12. A post singulation, bulk feed semiconductor assembly adapted to separate  
adhesive wafer saw tape from the plurality of dice of a singulated wafer, and bulk  
feeding the same in a substantially aligned manner, said assembly comprising:

10 a semiconductor feed tray having a collection end and an opposite feed end,  
and a collection surface extending from the collection end to the feed end;

a die separation assembly including:

a support base defining a support surface and having a first portion and  
an opposite second portion thereof, said second portion being positioned substantially  
15 adjacent the collection end of the feed tray such that the base support surface is  
positioned elevationally proximate the tray collection surface, and such that a thin  
elongated gap is formed between the tray collection end and the base second portion;  
and

a movable platform movably supported atop the base support surface  
20 for movement from said first portion to said second portion thereof, and downward  
through the elongated gap formed between the tray collection end and the base second  
portion at a first acute angle skewed from the support surface, said platform defining  
an upward facing adherence surface upon which at least one of a plurality of  
singulated wafer is adhered thereto, via the saw tape, each die being in a forward  
25 aligned manner, wherein upon movement of said platform through said thin elongated  
gap, a portion of said wafer saw tape thereat is peeled away from the respective die or  
dice, separating and releasing the respective die or dice onto the collection end of the  
feed tray in a manner substantially maintaining their respective forward alignment  
where the dice are urged toward the tray feed end and into contact with the respective  
30 dice previously released onto the collection surface; and

a die alignment assembly oriented at the feed end of the feed tray, and adapted to collectively cooperate with the dice at the tray feed end for final alignment before removal from the feed tray.

5     13.     The assembly as recited in claim 12, wherein

          said die alignment assembly includes a first die stop extending across and transverse to said feed tray, said die stop being selectively movable between a first position, preventing passage of the dice at the feed end therethrough, and a second position, permitting passage of the dice therethrough.

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14.     The assembly as recited in claim 13, further including:

          a semiconductor handling device positioned proximate the feed end of the feed tray for bulk feed of the aligned dice into discrete stations of the handling device subsequent die placement thereof.

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15.     The assembly as recited in claim 14, further including:

          said die alignment assembly includes a second die stop extending across the discrete stations of the handling device, said second die stop being selectively movable between a load position, enabling loading of the dice onto the handling device at the discrete station, and a transport position, permitting transport of the loaded dice on the handling device.

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16.     The assembly as recited in claim 12, wherein

          said second portion includes a down-ramped portion thereof skewed downwardly at said first acute angle from the support surface.

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17.     The assembly as recited in claim 16, wherein

          the base second portion further includes an up-ramp portion of the base skewed upwardly at a second acute angle from the support surface portion, said up-ramp portion and said down-ramp portion intersecting an apex edge portion where

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said saw tape is peeled away from the respective die during movement of the adhered wafer thereto.

18. The assembly as recited in claim 12, wherein

5 the thin gap formed between the tray collection end and the down-ramped portion is less than the height of the separated die and more than the combined thickness of the movable platform and the adhered saw tape.

19. The assembly as recited in claim 12, further including:

10 a top plate device positioned proximate to said base second portion, and spaced-apart from the base support surface by a distance sufficient to substantially prevent flipping of the respective die during separation from the saw tape, while maintaining.

15 20. The assembly as recited in claim 12, further including:

a driven roller assembly having a first roller and a second roller wherein said movable platform is in the form of an elongated sheet material of one-sided adhesive tape material having one end wound around the first roller, and the opposite end wound around the second roller for said selective movement of the movable platform  
20 from the first portion to the second portion of the base member.